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Research Paper

Aboriginal yards in remote Australia: Adapting landscapes for indigenous housing

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ABSTRACT

As the global predictions and effects of climate change have been emerging in recent years, thermal comfort is a growing concern for the marginalised, remote populations of the world including First Nations peoples. This paper draws on data from a qualitative climate change study with Australian Aboriginal people in the remote semi-arid region of Northwest Queensland and other regional studies to explore ways that yards can enhance thermal performance around conventional housing. Our investigations demonstrate that despite evidence of appropriate housing designs, living spaces outside of the house continue to be overlooked and under-utilised. Aboriginal people have modified their behaviour and made changes to their external living environments, often without sufficient resources, to achieve social and cultural continuity, energy efficiency and particularly to enhance thermal comfort. For these reasons, yards demand greater attention in the policy, planning and provision of housing and associated services for Aboriginal people.

1. Introduction

As set out in the UN charter of Human Rights, all people have the right to adequate housing, yet the disadvantaged status of First Nation Peoples compared to the majority population living in developed countries, including Australia, is closely associated with chronic and severe housing problems (OHCHR, 2005). Through the processes of colonization in these countries, the lives of First Nations people were fundamentally changed with the transition to settlements and housing types determined by either the church, the state or private speculators. Whether conventional or experimental, governments and authorities viewed housing as an effective setting for assimilation (Heppell, 1979). As a result, Indigenous people in settler societies lost control over their land and housing resources, and the planning of settlements.

The limited empirical research on Australian Indigenous housing has all but ignored the yards and outdoor spaces associated with dwellings. Housing research has focused on policy (Fien et al., 2008; Habibis et al., 2016), delivery and design as well as problems of occupancy related to crowding (Memmott, Birdsall-Jones, & Greenop, 2012), health (Pholeros, Rainow, & Torzillo, 1993) and cultural factors (Memmott, 2003). Yards and domestic landscapes have been marginal to this focus. Similarly, in the sparse relevant international literature on the social and cultural aspects of Indigenous housing, which includes Canadian and New Zealand, research on the use of domestic outdoor spaces is negligible.

As we demonstrate in this paper, Aboriginal people in remote regions of Australia occupy and sometimes adjust yards to maintain preferred social and cultural practices, but also to alleviate the ill-effects of inappropriate and substandard housing. It can be argued that they have pursued often subtle social and spatial practices in and around housing that reflect the 'indigenization of modernity' (Sahlins, 1999). Acknowledging Indigenous agency, and resistance to state institutions and planning, Aboriginal people persevere with and adapt their traditions, frequently in ways that are not noticed or viewed as culturally authentic, and therefore significant, by outsiders. Rarely recognised or supported, the use of yards around housing indicates not only preferred Indigenous domestic lifestyles, but effective adaptation to climates that are likely to become more uncomfortable in the coming decades.

2. Background

A disparate body of literature on Indigenous Australian societies and housing provides ample evidence that Aboriginal householders use their yards and outdoor spaces for distinctive social and cultural reasons that differ from non-indigenous Australians. This is particularly evident in remote and rural areas of Australia, where Aboriginal housing has received more scholarly attention than in urban areas,

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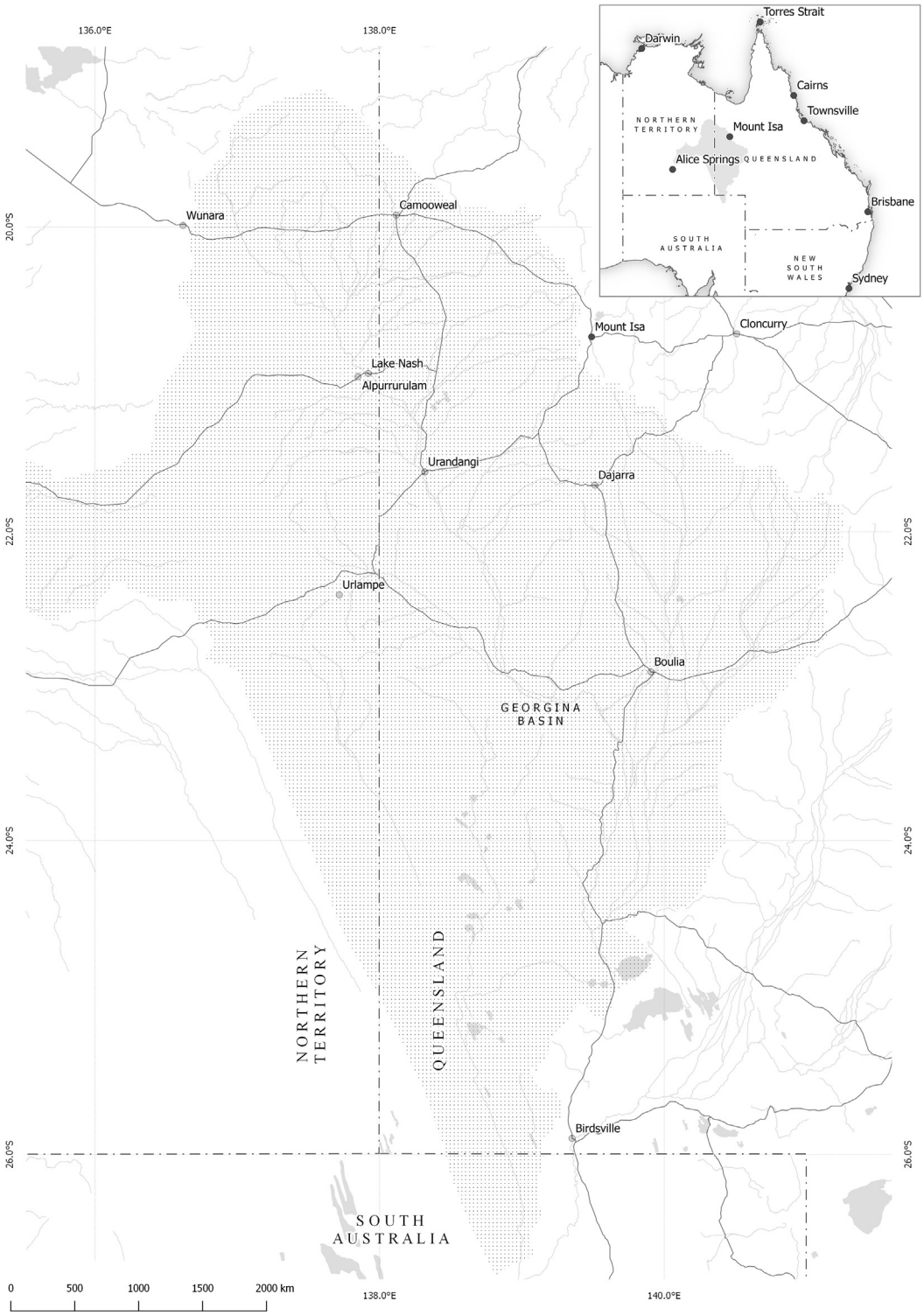

Fig. 1. Map of the Georgina River Region. Drawn by Paul Violett.

despite a changing demographic pattern for Indigenous populations (ABS, 2016). For many communities in remote and outer regional areas, the supply of conventional housing began in the 1970s and only gradually replaced self-constructed camps and humpies. The rectilinear plot, identified by survey and often fenced by wire mesh, replaced the socially defined but mostly unmarked and flexible boundary of the camp curtilage. The resulting outdoor domestic space comprised the house yard, or yard, as we prefer in this paper. With this abrupt change in living conditions, these spatially redefined yards were an integral part of social and cultural adaptations to conventional Australian housing. Despite obvious signs of differentiated and sustained use of yards by Aboriginal people, housing authorities rarely supported Aboriginal tenants' occupation and improvements to yards. Moreover, Australia has a history of housing and municipal authorities using building covenants and perceptions of tidiness as a tool to discriminate against Aboriginal people (see Rowley, 1972).

This paper explores the uses and functions of yards in Aboriginal housing, in the semi-arid upper Georgina River Region of Northwest

Queensland and the Northern Territory (NT) (see Fig. 1). The aim of the paper is to draw attention to the potential of these under-researched and ill-provisioned spaces for Aboriginal people to adapt to exacting environments and changing climates. While acknowledging that the enduring problems associated with Indigenous housing will not be solved with a singular design approach, we argue that the development of yards is significant for three main reasons. First, yards can support social and cultural practices, particularly when designed in consultation with the Aboriginal community. Second, yards and landscaping can reduce the cost of living through reduced energy consumption and by contributing to household economies. Third, yards are integral to improving environmental health and the comfort of householders through the provision of shade as well as shelter from wind and dust. We argue that it has been for these reasons that Aboriginal people have been modifying their behaviour in their living spaces and physically adapting their yards, often with minimal resources.

Our analysis relies on data collected in a recent study of climate change together with an understanding of the related and pressing problems of energy poverty for Aboriginal people in remote arid regions. Climatic conditions and poor quality living environments in these communities contribute to high-energy usage. The nexus between thermal comfort, water supply and energy consumption is further complicated by some uncertainty in the climate change models for the region, which suggest more extreme heat events during summer and less predictable patterns of seasonal rainfall.

A survey of the Indigenous housing literature establishes the relevance of external living spaces for Aboriginal groups living in traditional camps and later in housing, throughout the arid and semi-arid regions. Most of the evidence comes from Central Australia and Northern Australia, beginning in the 1970s when Aboriginal people moved from living in self-constructed shelters to conventional housing. More recently, attention has shifted to the implications of outdoor living for environmental health.

2.1. From traditional camps to the conventional house and yard

In the transition to mainstream housing, both the lack of design precedents and problems with the housing led to studies of Aboriginal domestic spaces and behaviours (Long, Memmott, & Seelig, 2007). In contrast to the several decades of useful housing research on design for both socio-cultural practices and environmental health, energy use and preferences for thermal comfort have received scant attention in the Indigenous housing literature, with a few recent exceptions (Duell et al., 2006; Martel & Horne, 2012). This is despite more than a decade of increasing domestic energy costs that affect household budgets of economically disadvantaged tenants. For some Aboriginal tenants, their yard is part of the solution to housing and energy problems.

2.1.1. Social and cultural practices

In the pre-contact and early colonial period, Aboriginal people used a repertoire of dwelling types in camps adapted to climate, the natural environment, mobility and socio-cultural factors. In arid and semi-arid regions, enclosed dwellings were used in wet weather but the predominant use of bough shades supported unconfined spaces and living that was open to the sky and horizon (Memmott, 2007; O'Connell, 1979). The camp layout and designation of social spaces were specific to different groups and places although normative patterns of settlement and domestic behaviours were similar across broad regions. For example, living spaces were arranged to respect social mores, such as kinship avoidance rules, and located in response to the local geography and the prevailing seasonal conditions (Fantin, 2003; Hamilton, 1972; Keys, 2003; Memmott, 2007; O'Connell, 1979; Ross 1987).

From the mid-1950s, housing was given priority by governments as a powerful force to assimilate Aboriginal people, encouraging them to live in the same manner as white people (Hasluck, 1963; Heppell, 1979). Remote Aboriginal housing in the 1950s and '60s was rudimentary with limited or no services. In attempting to "transition" Aboriginal people to the settler style housing, the basic construction—often un-lined sheet metal cladding—offered poor thermal comfort in either summer or winter (Saini, 1967). As Reser observed in the 1970s, "houses were not lived *in* as such but *around*" (1979, p. 67*)*. People preferred semi-enclosed and outdoor cooking, eating, sleeping and socialising as well as opportunities to monitor both the natural and social environment (Heppel & Wigley, 1981; Memmott, 2003; Musharbash, 2009). Many Aboriginal families in the study region and elsewhere have continued to live in this way.

By the 1980s and 1990s, it was well documented that living and sleeping outside of government-supplied houses were common practice across the regional and remote areas for Aboriginal people (Long, 2005; Musharbash, 2009; Nganampa Health Council, 1987), and that outdoor activities and habits were continuous with the traditions of customary camps (Memmott, 2003; Reser, 1979; Tonkinson & Tonkinson, 1979). These traditional spatial preferences and domestic behaviours were based on Aboriginal kinship relationships and connections to place that were frustrated by conventional houses, delivered on an expectation of sedentary settlement. Visiting of kin is a social and cultural (and sometimes economic) imperative for many Aboriginal people, and is commonplace in the study region (Memmott, Long, & Thomson, 2006). Although the motivations, frequency and duration varies, extended stays by visiting relatives and friends is one of a number of factors contributing to overcrowded housing (Al-Yaman, Van Doeland, & Wallis, 2006). External living spaces have been used to decrease household density but also to maintain social grouping, particularly for sleeping (Memmott et al., 2012). As well as offering spatial relief for large households, it can be argued that yards have been highly useful in maintenance of social practices and kinship networks.

2.1.2. Energy use

The consumption and cost of energy in remote Aboriginal communities exacerbates disadvantage (Race, Mathew, Campbell, & Hampton, 2016). Over the last decade, a significant increase in the cost of electricity and gas has coincided with higher rates of energy usage, related to air-conditioning and a proliferation of electric devices (refrigerators, televisions, phones and computers). In social housing, responsibility for utilities places a burden on the primary tenant, and non-payment of bills can be the cause of eviction. Yards and landscaping serve two purposes in mitigating energy use: the microclimatic effects of effective landscapes reduce heating loads on housing and the use of shaded yards reduces the need for air-conditioned spaces. Development of the yard for passive cooling, particularly in the daytime, would be cost-effective rather than a dependency on 'capital outlays inside dwellings' (Horne, Martel, Arcari, Foster, & McCormack, 2013, p. 41) especially in hot, arid regions of Australia (Duell et al., 2006, p. 14).

2.1.3. Environmental health

The relevance of yards to Indigenous health, particularly in remote regions, has been of ongoing concern to some planners and policy advisors. Written largely from an environmental health perspective, the *National Indigenous Housing Guide* (Australian Government, FaCSIA, 2007) devotes a section to the design principles for yards. The work of Healthabitat and architect Paul Pholeros (Nganampa Health Council, 1987; Pholeros et al., 1993) informed the Guide, which lists landscape treatments to limit dust through a combination of plantings and fencing and to promote passive cooling through plantings and shade. In the 1990s and 2000s, architects included the design of yards in remote housing proposals in response to housing policy and funding from an Australian Government initiative. The National Aboriginal Health Strategy included specifications to improve Indigenous health through design and architectural plans for these projects described covered areas and landscape treatments in fenced yards that reflected Aboriginal preferences for outdoor living (Fisher & Scally, 2008; Memmott, 2001). Similar recommendations have continued to appear in the

literature (e.g. Walls, Bridge, Millikan, & Davy, 2013), however the widespread adoption and extrapolation of these design guidelines has been limited, despite its availability over three decades.

2.2. Why have yards been neglected?

With the evidence that external living spaces are significant for social and cultural, energy cost and environmental health reasons, why have yards (particularly landscaping and tree-planting) so often been neglected in the building process? A simple economic explanation for lack of attention to the external living areas in Aboriginal housing has been budgetary limitations (Fien & Charlesworth, 2011). Thirty years ago, the UPK Report (Nganampa Health Council, 1987) included inadequate funding and planning attention to the yard area, as one of several factors contributing to inadequate housing in some Central Australian Aboriginal communities. In a more recent example, an Australian Government housing program included 'landscaping and yard design elements' in the initial budget that were changed in favour of financial savings (Davidson, Go-Sam, & Memmott, 2011, p. 105). Such decision-making appears to have contradicted good practice for Aboriginal housing.

A lack of capital funding for the design and construction of landscaping is exacerbated by the lack of support for the residents of Aboriginal housing. A post-occupancy survey of housing in the town camps of Alice Springs in 2008 (Centre for Appropriate Technology, 2012, p. 6) reported that Aboriginal survey participants had desired plants and shade structures but could not afford to do so, unsurprising given the levels of poverty in these communities.

Policies on landscaping for Indigenous remote housing are fragmented and inconsistent across different jurisdictions. The guidelines for standards in remote housing that are set out below are not mandatory:

> The requirement for the provision of turf and/or other landscaping will be as instructed by the State and determined on a case by case basis in consultation with Councils and consider the cost and likelihood of successfully establishing and maintaining vegetation (Queensland Government, 2016, p. 15).

According to the recent *Remote Housing Review* (Australia, 2017), tenants expressed confusion about their rights and responsibilities including about responsibility for yard maintenance, which although focussed on tidiness would also include establishing and maintaining vegetation. Furthermore, the report states that jurisdictions have responded in different ways reflecting historical practices, with varying success to support and educate the tenants. This report also included in its findings that '[p]roperty management needs to prioritise the monitoring and maintenance of the health functioning of homes' (Australia, 2017, p. 55). Although this category could include landscaping and yard development, to date this is not the case.

The neglect of yards by policy makers, designers and the managers of social housing ignores residential preferences, environmental health problems attached to housing, and the obvious benefits of shade and vegetation in hot, arid climates.

In the study area, research on Aboriginal people's perceptions of climate change and their ability to adapt to change revealed the stress in their daily lives (Memmott et al., 2013). The following case study examines the opportunities and barriers for yards in the upper Georgina River Basin to increase thermal comfort as an adaptive strategy to reduce the adverse effects of climate change.

2.3. Methods

Our primary data are drawn from a study of climate change in the upper Georgina River basin in Northwest Queensland and the Northern Territory (Memmott et al., 2013). The study aimed to investigate Aboriginal perceptions and knowledge of climate change as well as Aboriginal people's adaptive responses to change. Local housing and infrastructure was a significant research stream of the study. Data were collected in 2012 through semi-structured interviews (survey) and two workshops involving Aboriginal participants from the region. Mt Isa, with a population of about 22,000 people, is the primary service centre for these and other settlements in the region.

A total of 72 people were interviewed, including 42 males and 30 females ranging in age from 17 to 81 years of age (average age 52). Three respondents were not Aboriginal but were long-term residents in the region. Although the majority of Aboriginal participants identified with socio-linguistic groups that have both pre-contact and historical connections in the region, they had diverse backgrounds in terms of life experiences, education and English language ability. Interviews were based on a survey that primarily elicited levels of agreement with statements about perceptions of climate and climate change. The survey instrument was based on selected items from a national survey, and rated items and open-ended questions which were developed specifically for the target sample (for detailed discussion of the project's research methods see: Nash, Memmott, Reser, & Suliman, 2018). Qualitative questions probed the participant's experience and use of housing and utilities. Several Aboriginal survey participants attended workshops in Camooweal together with local and regional service providers and discussed adaptive responses to climate challenges, including the role of yards and outdoor living spaces.

The open-ended responses in each of the survey streams, including Housing and Infrastructure were collated and tabled (see Appendix 2: Memmott et al., 2013). These responses together with relevant contributions from workshop participants were reviewed and coded manually by the research team. Special attention was given to the relevance and frequency of comments from the survey responses and from videotaped workshop discussions. Key themes are reflected in the analysis of the data and illustrated by the most illustrative quotations.

The team was able to draw on considerable experience in cross-cultural research with Indigenous people in the region and elsewhere in Australia. As part of the research protocols, findings from different stages of the study were disseminated not only to academic and professional audiences in capital cities but also through workshops for the local Indigenous people who took part in the survey and discussions. These workshops were held in the centrally located Indigenous cultural and training centre where representatives of the respondents were invited to attend.

2.4. Study region: The upper Georgina River basin

The ecological boundaries of the study area aligned with the upper drainage basin of the Georgia River (see Fig. 1). Historically, Camooweal, Dajarra and Urandangi were frontier settlements established to service the large sheep and cattle stations that usurped Aboriginal occupation of the country in the 1880s. Authoritarian and often violent state sanctioned colonial processes transformed and disrupted pre-contact Aboriginal cultural practices as well as settlement and mobility patterns (Kidd, 1997; Memmott et al., 2013) . Although dislocated from their traditional homelands, many Aboriginal people have maintained distinctive Aboriginal cultural traditions, including their language. Most residents of Alpurrurulam, just across the state border in the Northern Territory speak at least one Aboriginal language.

Most of the Georgina River region is classified as 'very remote' and the regional centre of Mt Isa is a 'remote' location (ABS, 2014). Goods and services are limited in the small communities and residents must travel regularly to Mt Isa for health services, education and retail services. For residents of Alpurrurulam, road travel is subject to the seasons and floodwaters frequently make roads impassable for several days at a time in the wet season. Travel can also be hazardous for people during extreme hot weather. Vehicle break down is a very familiar occurrence for Aboriginal people using conventional cars in the

Table 1
Demographic data on towns in the study region.

Place	Total population[1]	Indigenous population[a]	Percentage indigenous	Distance/driving time to Mt Isa
Alpurrurulam, Northern Territory	425	387	91%	290 km unsealed road Approx. 9 h
Camooweal, Queensland	210	91	43%	190 km sealed road 2 h
Dajarra, Queensland	191	117	61%	155 km sealed road 2 h 20 mins
Marmanya (Urandangi) Queensland	No census data	ca. 30[b]	NA	183 km unsealed roads Approx. 5 h 30 mins

[a] Australian Bureau of Statistics (ABS), (2016) Census of Population and Housing: Community Profiles.
[b] Personal communication with local residents, 2008.

typically rough conditions of unsealed roads. Table 1 and Fig. 1 illustrate the size and remoteness of towns in the region.

The majority of housing in the settlements under study is detached dwellings on lots ranging from about 750 to 1200 m^2. The lots are usually fenced but landscaping in the yards varies considerably, from 20% tree canopy to yards devoid of trees. The houses, typically two- or three-bedroom, have been built under varied state and national government funding initiatives from the mid-1970s to 2010s.

2.4.1. Climate

The upper Georgina River basin is a semi-arid tropical region where the climate in the northern parts features wet monsoonal rainfall and a cool dry winter season. In the southern more arid areas, the climate is typically cool and dry in winter and hot in summer. Across the basin, rain occurs mostly in the hot summer season from November to April, however there is considerable inter-annual and regional variability. Records show that the climate for inland Australia is changing, bringing hotter and wetter summers with less rain in winter (Australian Bureau of Meteorology, 2016). In the Northern inland, including the Georgina River Basin, there is a likely to be an increase in temperature of between 0.6 °C and 1.5 °C by 2030 and larger differences by 2090 (Watterson et al., 2015) that would increase the number of extreme heat days and events. Although more flooding events and more late summer bush fires seem likely, uncertainty surrounds climate predictions and potential consequences.

2.5. Survey results

The 2012 survey of Indigenous people and two community workshops elicited data on the seasons, extreme weather events and longer-term climate change. Relationships between housing, thermal comfort and climate were included in these data. Prior research in this region (Long, 2005; Memmott et al., 2006; O'Rourke, 2011) contributed to the formulation of the survey questions and provided knowledge of the settlements, infrastructure and housing conditions. Observations in the field from the previous studies and ongoing relationships with several of the key informants added to analysis of the data and the discussion that follows in this paper.

Questions about housing, settlements and infrastructure revealed attitudes to design and thermal comfort, preferred domestic living practices and suggested adaptive changes to houses and yards. Not surprisingly, given the quality of construction, the majority of the survey respondents (72 per cent n = 68) agreed that their house was too hot in summer with similar numbers stating that their houses were too cold in winter. Despite the relative brevity of the cold season, winter minima tend to register as a source of greater discomfort for Aboriginal people in arid regions than the heat across the long summer and hence their preference to sit in the yard with a fire (Horne et al., 2013).

To 'get through summer', over 70 per cent of the surveyed residents used air-conditioning, with the majority of houses fitted with either evaporative or refrigeration cycle air-conditioners. Less than half the respondents indicated a preference for an air-conditioned house although it is unclear whether choice was related to comfort or the cost of operating air-conditioning. According to the survey, preferences for outdoor living over use of indoor spaces were still prevalent, with external areas identified as the preferred option during high to very high summer temperatures.

Just over half of the respondents indicated that they spent most of their time outside in summer during the day, with 73 per cent of the respondents expressing a preference for outdoor shaded areas over internal rooms. Nocturnally, just under half of the respondents preferred to sleep outside in summer, a pattern that has been observed across arid and semi-arid regions (Long, 2005; Musharbash, 2009; Pholeros et al., 1993). From the comments recorded across the Georgina River region study it seems that these patterns were persistent for social and cultural reasons but also because of thermal discomfort inside their houses. A smaller, but still significant, number (37 per cent) had changed the way they lived in their house and yard due to extreme weather events.

A qualitative question about adapting housing to increasing periods of hot weather provided further evidence of the importance placed on yards for improving thermal comfort. The most frequent adaptive approach to extreme heat events that was suggested focussed on landscaping changes to the respondent's yard. Planting trees was the most common of these proposed adaptive responses. A Dajarra resident aged in her 70s, 'would like to grow trees' in her yard for the hotter conditions—she lived in a state government house with no trees or shrubs in her garden. To improve thermal comfort in more extreme hot weather, an Aboriginal man in Alpurrurulam proposed to 'grow more trees around it and put more lawn around it.' Another resident from Alpurrurulam suggested that a desirable renovation for her house was to 'grow creeper for verandah shade.' As these types of responses recognise, trees, groundcover and vine-covered walls are an effective method of altering the microclimate around housing in semi-arid regions.

Other adaptive approaches to hot weather included the construction of bough sheds (related to traditional Aboriginal shade structures) in their yards (see Fig. 2). For example one Aboriginal woman from Dajarra suggested a '[p]lan to [build] bough shades before summer' for coping with summer heat extremes. A middle-aged male resident from Alpurrurulam would 'build a bough shed or go sit under a tree. Wouldn't change house, have winter side and summer side for house.'

Fig. 2. A Dajarra yard with windbreak and bough shade to support outdoor living. *Source*: Timothy O'Rourke.

This idea reconfirms Long's (2005) observations of Dajarra houses where long-term Aboriginal residents adapted and used the external areas around government-provided houses in response to the seasonal conditions. A general preference for outdoor living combined with this apparent interest in improving the domestic yards offers a potentially effective and relatively inexpensive technique for building structural and behavioural adaptation to climate change.

To improve thermal comfort in summer, respondents suggested alterations or additions to their house. (Only nine out of 72 respondents proposed using air-conditioning as a response to higher summer temperatures.) Six respondents suggested adding verandahs to their houses to improve their performance and/or increase their living options in hot weather:

'Open windows. Big verandahs all around.' (middle-aged woman, Mt Isa)
'Better with verandahs.' (middle-aged man, Dajarra)
'More fans, bigger verandah right round.'(elderly man, Dajarra)
'Open it up and put verandahs on it.' (middle-aged man, Urandangi)

The remarks about adapting housing for summer heat extremes indicate that Aboriginal people considered a combination of housing additions and alterations, landscaping strategies and behavioural responses to mitigate the summer heat.

The third question requiring a qualitative response asked about adaptation to increasing energy costs. Of those who responded, 14 people stated that they would ration their electricity use. Sixteen of the respondents proposed reverting to traditional practices to cook outside on wood fires, with half of those choosing to camp outside of the house. Electrical stoves were unlikely to be the primary source of electrical consumption, compared to hot water and refrigeration, but a frequent response to reduce energy was to use outdoor kitchens:

'Cook outside, [electric] stove most expensive.' (middle-aged woman, Dajarra)
'Use a kerosene lamp and get some wood for fire.' (middle-aged man, Alpurrurulam)
'Camp outside. Use a fire.' (middle-aged man, Camooweal)

Across different communities in the region, these responses portrayed both a familiarity with and comfort from traditional domestic practices that were poorly supported by the existing housing.

Although the survey sought to examine responses and adaptive approaches to climate, this reason for the use of yards is intertwined with socio-cultural habits and custom. If, for example, one resident was unable to meet her energy costs for her Alpurrurulam house, her solution was to 'camp out a lot more. Old place we had no power. Today got to go get wood for cooking kangaroo tail.' Whether used for thermal comfort, outdoor cooking or socialising, the overlapping functions of yards underscore their potential to offer improvements to substandard housing conditions that are common in these communities.

Invited representatives from the Aboriginal communities gathered with the research team in the first workshop to expand on their experience and knowledge of climate in the region and to discuss adaptation strategies. The workshop participants demonstrated that they were acutely aware of changing weather patterns and recognized the need to improve the preparedness of settlements and infrastructure. These ideas were explored in the second workshop that involved a similar group of Indigenous community representatives from the four study locations and other regional stakeholder groups, including social service organizations as well as land and resource management bodies. Housing and infrastructure were integral to these discussions which repeatedly suggested that current housing compromised the people's ability to live in culturally and environmentally sustainable ways. Day-to-day social and cultural practices, the high cost of heating and cooling poor quality housing and the need for improved environmental health were significant areas of concern.

2.6. Discussion: Opportunities and barriers for yard design and use

The survey responses about the advantages of landscaped yards, coupled with consistent patterns of use, raise questions about current housing procurement, the apparent neglect of yards by housing providers, impediments to change and potential solutions. Observations of these communities over several decades confirm that some residents of social housing established gardens and continue to build shade structures and use outdoor kitchens. The quality of the domestic landscapes vary, as do the reasons for gardening but the opportunities and barriers to improve yards are a combination of economic, social, cultural and climatic factors, including landscaping, water supply, housing tenure, energy use, thermal comfort and the consideration of Aboriginal cultural practices.

2.6.1. Landscaping

The absence or erosion of landscaping budgets in housing delivery is commonplace across the construction industry, but the legacy for Aboriginal housing in remote arid regions perpetuates disadvantage. The landscaping is left to the tenants and the majority lack the resources to invest in a property that offers little long-term security. Tenants in the Mt Isa region can struggle to furnish their houses or meet rent and utility payments at certain times of the year (Memmott & Nash, 2016) and so funds for landscaping are most likely unavailable. In more recently constructed housing, budgets allow for chain wire fencing around yards, which may retain remnant trees but little else except bare ground.

Even with disposable income or support, horticultural supplies are distant, and the climate poses challenges to establish and maintain gardens that are influenced by temperate or subtropical precedents. Those residents who garden, often collect seeds and cuttings from diverse sources during their travels throughout the region. In Dajarra, informants identified the provenance of established trees (both exotic and native) that had been gathered and transplanted as seedlings (see Fig. 3). It should also be noted that Aboriginal householders in remote regions have demonstrated limited success and motivation to grow exotic fruit and vegetables, either in their yards or in communal gardens (for the Western Desert see Nash, 1993) despite potential opportunities (e.g. Davies, Maru, Hueneke, Grey-Gardner, & Chewings, 2010). (Although relevant, influences on Aboriginal gardening preferences are little understood and beyond the scope of this paper.)

2.6.2. Water supply

For Aboriginal residents of conventional housing living in arid regions, mainstream water supply is sometimes unavailable yet critical for maintaining adequate living environments. As demonstrated for Dajarra over many years, the shortage of water supply and also the

Fig. 3. Dajarra house and shade trees collected as seedlings during visits to other places. *Source*: Timothy O'Rourke.

quality of available water has affected the lives of residents and at times the viability of the small town (O'Rourke, 2011). In the hotter and drier months of the year uncertainty about water prevents residents from being able to manage usage beyond their basic needs. In these cases, water for landscaping must assume a low priority despite the increasing need for passive cooling through planting for shade and also for dust suppression around living areas.

A relatively high number of households that maintain grass around their houses must combat the climate and work with variable water supplies and restrictions. Aboriginal people may plant in their yard for a variety of reasons but they maintain lawns to reduce dust and as a play area for children. Suppression of dust is advocated for health reasons by the *National Indigenous Housing Guide*, and particularly in arid regions (Australian Government, FaCSIA, 2007, p. 168). In January 2016, more than half of the Aboriginal yards in Dajarra contained grass around the house (about 70 per cent of the occupied houses). The area of lawn was variable but establishing and maintaining a lawn continues to be challenging given the extended hot-dry summers and low rainfall.

In Dajarra, State-managed housing demonstrated significantly less landscaping (vegetation or structures) than housing owned and managed by the Indigenous housing cooperative Jimberella. One resident who moved into a new Jimberella house in 2009 has since maintained a range of plantings in the yard that he had purchased from the regional centre Mt Isa and also acquired from other people (see Fig. 4). He was motivated to garden partly by his preference for green landscapes and for fruit trees but also to have a lawn and shady play areas for children. Despite drought and his need to travel regularly, the success of the plantings at the time of writing demonstrated the continuing motivation of the householder (and his cooperative neighbours).

2.6.3. Housing tenure and socio-economic disadvantage

Approximately 30 per cent of Aboriginal households in the study region live in social housing (ABS, 2016) and the percentage is much higher in the small communities and towns outside the regional centre of Mt Isa. All social housing tenants are subject to the relevant policies regarding the use and maintenance of the property including the yard. For some Aboriginal tenants the rules about appropriate behaviour, neighbours and tidiness have often been difficult to abide by when the rules are based on mainstream behavioural norms. Problems over yards have typically arisen when tenants accommodated visiting relatives in their houses often for extended periods, especially as yards were frequently used for the extended group to socialise and for sleeping by the visitors (Memmott & Nash, 2016; Moran et al., 2016). In these situations crowding can occur. Large households combined with alcohol and drug abuse can lead to neighbourhood disturbances, damage to property as well as family violence.

Fig. 4. Keith Marshall's house and front yard in Dajarra, 2012. *Source*: Daphne Nash.

Following the introduction of an anti-social behaviour policy in 2013, the Queensland Department of Housing and Public Works in Mt Isa initiated a mass community clean-up of yards, removing outdoor rubbish, furniture, beds, windbreaks and fireplaces, and generally discouraged people from sitting outside their houses in public view (Memmott & Nash, 2016). Although the new rules applied to all social housing tenants, some Aboriginal families in Mt Isa perceived the rules as restrictive of their long-standing social and cultural practices of outdoor living. With negligible support for landscaping, the policy discouraged the habitual use of yards by Aboriginal tenants. As social housing tenants, they are an economically disadvantaged group with high needs and limited resources (Memmott & Nash, 2016; Moran et al., 2016). Such singular policies therefore affected the most vulnerable people in the community including their options to mitigate excessive energy costs through the use of yards.

2.6.4. Social and cultural practices and energy use

The external focus of domestic life around houses in remote and regional Aboriginal communities has been described as an extension of enduring domestic cultural practices that predate colonisation (Memmott, 2003; Musharbash, 2009). In an extensive study of Dajarra in the late 1990s, Long (2005) described both the adjustments to yards and an external living focus as a continuity of traditional practices.

Empirical evidence for the prevalence of outdoor living over the last two decades is limited, despite the need to better understand relationships between the use of housing and energy consumption. Demographic and social factors, combined with technological change suggest altered patterns of using domestic space with decreasing time spent outside of the house, exemplified by younger people using varied digital media in air-conditioned rooms. This trend may be accentuated by a relatively young age structure of the Indigenous population (AIHW, 2015). Apart from observations by Musharbash (2017), this shift in behaviour and the use of houses has received little attention, although our survey responses indicated age-related differences. Participants in this study who were over 55 years of age and familiar with outdoor living often saw those practices as solutions to thermal comfort and to increasing energy costs. On the other hand, younger participants demonstrated some awareness and concern about climate change but they did not focus on outdoor living areas or yards as an adaptive strategy.

The relatively high intraregional mobility of Aboriginal people in the study region (Memmott et al., 2006) can create problems for both housing and yards. First, to establish and maintain plantings, residents need to water the plants, particularly in the early stages and during the hotter time of year. As we heard from Dajarra residents, frequent absences from home for extended periods, as often undertaken by Aboriginal families when they visit relatives, puts yard development in jeopardy. Second, high visitor numbers place an added burden housing hardware, landscapes and the finances of the primary tenant. Current research on energy use and financial stress and adaptive strategies is minimal and deserves attention particularly because of significant increases in the price of electricity and gas. But self-built structures in yards that modify microclimates —windbreaks, shade structures and fireplaces —challenge the aesthetic norm for domestic landscaping in settled Australia. The cultural and functional significance of these seemingly *ad hoc* landscapes has remained relatively unrecognised and under-researched (Godwin-Thomson, 2014).

2.7. Management recommendations: Towards sustainable yards

For the Aboriginal householders in this study, community-led design practice is needed for planners and architects to respond appropriately to people's living practices including their use of outdoor spaces and yards.

From the early 1980s onwards in Central Australia, Tangentyere Council has been an exponent of community-led design practice for

Aboriginal housing in Alice Springs town camps and for remote communities in the region (Broffman, 2015; Wigley & Wigley, 2003). During that period, high levels of mobility have been a challenge in the town camps particularly from effects of crowding. Apart from supporting people's preferences for everyday living, their yards need to be enhanced to accommodate visitors for all their needs including appropriate design for outdoor sleeping. The extent to which design can solve the problems is linked to many other factors including funding. Based on our findings, multiple reasons—socio-cultural, economic and thermal comfort—for investing capital and time in yards can mutually reinforce ways to improve the housing experience for Aboriginal people. So what needs to be done?

- If implemented from the planning stages, a consultative approach to housing design can extend to the yard and recognise landscaping preferences, as well as elements and biota appropriate to place. To be most effective, planners and designers need to have an understanding of Aboriginal people's landscaping preferences, including those based on their continuing cultural practices, as well as the opportunities and limitations of the place.
- Aboriginal practices and desire for self-constructed shelters need to be investigated and supported for each community. Adaptations of traditional shade structures are relatively inexpensive. Such structures need to comply with building codes but there is considerable scope to adapt self-building practices to improve responses to climatic conditions and future change in yards.
- Water supply and quality, gardening and plant choice in yards pose a difficult problem in arid regions, compounded by the uncertainties of climate change. The supply of place specific infrastructure and hardware must be coupled with community education to build the knowledge and skills to maintain sustainable water supplies and use, which includes rainwater, bore water and grey water systems (Seemann, Parnell, McFallan, & Tucker, 2008).
- Flexible tenancy management supported by better informed policies are more likely to bring improved and sustainable changes. Social housing tenants who want to garden or adapt their yards need to be appropriately resourced and encouraged to do so, for the long-term benefit of the housing assets.

In summary, the design of functional and culturally supportive yards relies on adequate funding, available expertise and an integrated approach to housing design that considers equally the exterior and interior of the detached house. The best outcomes will also rely on community-led planning and practice that reflect the changing patterns of living in houses and yards.

3. Conclusion

Policy makers and housing authorities have continued to undervalue the significance and potential of the yard for improved and sustainable living for Aboriginal people, particularly in remote semi-arid regions, where the yards in Aboriginal housing have been under-resourced and under-researched. Our study demonstrates that outdoor living has continuing cultural and social value for Aboriginal people, many of whom make self-constructed additions to their houses and outdoor living spaces. Landscaping and other yard structures can provide culturally appropriate adaptation to the effects of climate change, particularly the increasing number of hot days in semi-arid regions, in the form of outdoor sleeping areas and daytime living spaces. On the other hand, changing attitudes and behaviours by the younger generation may work against the recent historical use of yards as they favour indoor living and related practices that rely on generation of electricity.

Despite changing domestic practices, relatively high levels of mobility require Aboriginal housing to accommodate more people than planned for in conventional housing. Shortfalls in Aboriginal housing and also the problems of aging social housing stock contribute to social and health problems in the Aboriginal population. Current demographic trends and persistent Indigenous mobility patterns indicate that housing deficits will continue to be the norm in regional and remote places. Additional, more detailed research into yards and Indigenous housing is much needed, but the results of our study suggest that more consistent investment in the landscaping of yards can help ameliorate the poor conditions in Indigenous social housing in a variety of ways.

Although in need of support, experimentation and evaluation, the activities of individual householders observed in the Georgina River region demonstrate that yards could potentially be significant sites of adaptive response to the challenges of climate change, in particular thermal comfort and energy efficiency. A consistent policy objective is required for Aboriginal housing that acknowledges the significance of the yard in government-supplied housing through allocations of specified funding that includes support for Indigenous housing organizations and tenants.

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